

What is claimed is:

1. A liquid crystal display device comprising:

a first substrate having a first electrode formed on one surface side and a first vertical alignment film to cover the first electrode;

5 a second substrate having a second electrode formed on a surface side opposing to one surface of the first substrate, a first projection pattern formed of insulating material on the second electrode, and a second vertical alignment film for covering the second electrode and the first projection pattern, whereby top end portions of the first projection pattern come into contact with the first substrate; and

10 a liquid crystal sealed between the first substrate and the second substrate and having a negative dielectric anisotropy.

2. A liquid crystal display device comprising:

a first substrate having a plurality of first electrodes formed on one surface side and a first vertical alignment film for covering the plurality of first electrodes;

15 a second substrate having a light shielding film formed on a surface side to oppose to one surface of the first substrate to be arranged in regions which correspond to regions between the plurality of first electrodes on the first substrate, a plurality of color filters arranged to oppose to respective first

electrodes on the first substrate, a second electrode formed over the light shielding film and the plurality of color filters, a first projection pattern formed of insulating material on the second electrode, and a second vertical alignment film for covering the second electrode and at least the first projection pattern on the second electrode, whereby top end portions of the first projection pattern formed over the light shielding film come into contact with the first substrate; and

a liquid crystal sealed between the first substrate and the second substrate and having a negative dielectric anisotropy.

3. A liquid crystal display device according to claim 2, wherein the light shielding film is formed by overlapping at least two color filters of the red, green, and blue color filters.

4. A liquid crystal display device according to claim 2, wherein the first projection pattern comes into contact with the second substrate at portions located over the light shielding film.

5. A color filter substrate comprising:
a plate;
a light shielding film formed on predetermined regions of the plate;
a plurality of color filters formed between the regions of light shielding films;

an electrode formed over the light shielding film and the color filter;

a projection pattern formed of insulating material over the electrode; and

5 a vertical alignment film for covering the projection pattern.

6. A method of manufacturing a liquid crystal display device, comprising the steps of:

10 forming a light shielding film which cuts off a light between respective pixel regions on a first substrate;

forming color filters on the pixel regions on the first substrate;

forming an first electrode on the color filters;

15 forming a first projection pattern formed of insulating material on the opposing electrode;

forming a first vertical alignment film which covers the opposing electrode and the first projection pattern on an upper side of the first substrate;

20 forming a plurality of second electrodes on an upper side of a second substrate;

forming a second vertical alignment film which covers the pixel electrodes on the upper side of the second substrate; and

25 arranging the first substrate and the second substrate such that their surfaces on which the first vertical alignment film and the second vertical

alignment film are formed respectively are opposed to each other and top end portions of the first projection pattern come into contact with the second vertical alignment film on the second substrate.

5 7. A method of manufacturing a liquid crystal display device, comprising the steps of:

10 forming selectively any one of red, green, and blue color filters in respective pixel regions on a first substrate, and then forming a light shielding film by overlapping at least two color filters of the red, green, and blue color filters in regions between the pixel regions;

15 forming a first electrode on the color filters;

15 forming a first projection pattern formed of insulating material on the opposing electrode;

20 forming a first vertical alignment film which covers the opposing electrode and the first projection pattern on an upper side of the first substrate;

20 forming a plurality of second electrodes on an upper side of a second substrate;

25 forming a second vertical alignment film which covers the pixel electrodes on the upper side of the second substrate; and

25 arranging the first substrate and the second substrate such that their surfaces on which the first vertical alignment film and the second vertical alignment film are formed respectively are opposed to

each other and top end portions of the first projection pattern come into contact with the second vertical alignment film on the second substrate.

8. A liquid crystal display device comprising:

5 a first substrate having a plurality of first electrodes formed on one surface side and a first vertical alignment film for covering the plurality of first electrodes;

10 a second substrate having red, green and blue color filters arranged to oppose to the plurality of first electrodes on the first substrate, a light shielding film formed by overlapping at least two color filters of these color filters to be arranged in regions which correspond to regions between the plurality of first electrodes, a second electrode formed to cover at least the color filters, a cell thickness adjusting layer formed selectively over the light shielding film, a projection pattern formed of insulating material on the second electrode and the cell thickness adjusting layer, and a second vertical alignment film for covering the second electrode and at least the projection pattern on the second electrode, whereby top end portions of the projection pattern come into contact with the first substrate; and

15 a liquid crystal sealed between the first substrate and the second substrate and having a negative dielectric anisotropy.

9. A color filter substrate comprising:

a plate;

red, green and blue color filters formed on predetermined regions of the plate;

5 a light shielding film formed by overlapping at least two color filters of these color filters to be arranged on predetermined regions of the plate;

an electrode for covering at least the color filters;

10 a cell thickness adjusting layer formed selectively over the light shielding film;

a projection pattern formed of insulating material over the electrode and the cell thickness adjusting layer; and

15 a vertical alignment film for covering the electrode and at least the projection pattern on the electrode.

10. A liquid crystal display device comprising:

20 a first substrate having a plurality of first electrodes formed on one surface side and a first vertical alignment film for covering the plurality of first electrodes;

a second substrate having red, green and blue color filters arranged to oppose to the plurality of

25 first electrodes on the first substrate, a light shielding film formed by overlapping at least two color filters of these color filters to be arranged in

regions which correspond to regions between the plurality of first electrodes, a second electrode for covering at least the color filters, a projection pattern formed of insulating material on the second electrode, a cell thickness adjusting layer formed on the projection pattern over the light shielding film, and a second vertical alignment film for covering at least the second electrode, whereby top end portions of the cell thickness adjusting layer come into contact with the first substrate; and

a liquid crystal sealed between the first substrate and the second substrate and having a negative dielectric anisotropy.

11. A color filter substrate comprising:

15 a plate;

red, green and blue color filters formed on predetermined regions of the plate;

20 a light shielding film formed by overlapping at least two color filters of these color filters to be arranged in predetermined regions of the plate;

an electrode for covering at least the color filters

a projection pattern formed of insulating material on the electrode;

25 a cell thickness adjusting layer formed on the projection pattern over the light shielding film; and a vertical alignment film for covering at least the

electrode.

12. A liquid crystal display device comprising:

a first substrate having a plurality of first electrodes formed on one surface side and a first vertical alignment film for covering the plurality of first electrodes;

a second substrate having a light shielding film formed of light non-transmitting material to be arranged in regions which correspond to regions between

the plurality of first electrodes, red, green and blue color filters which are arranged to oppose to the plurality of first electrodes on the first substrate and at least one of which covers the light shielding film, a second electrode for covering the color filters,

a projection pattern formed of insulating material on the second electrode, and a second vertical alignment film for covering the second electrode and at least the projection pattern on the second electrode, whereby top end portions of the projection pattern come into contact with the first substrate; and

a liquid crystal sealed between the first substrate and the second substrate and having a negative dielectric anisotropy.

13. A color filter substrate comprising:

25 a plate;

a light shielding film formed of non-transmitting material to be arranged on predetermined regions of the

plate;

red, green and blue color filters at least one of which covers the light shielding film;

an electrode for covering the color filters;

5 a projection pattern formed of insulating material on the electrode; and

a vertical alignment film for covering the electrode and at least the projection pattern.

14. A method of manufacturing a liquid crystal
10 display device, comprising the steps of:

forming color filters in pixel regions on a first substrate, and then forming a light shielding film by overlapping two layers or more of the color filters in regions between the pixel regions;

15 forming an opposing electrode on at least the color filters;

forming a cell thickness adjusting layer formed of insulating material in predetermined regions over the light shielding film;

20 forming a projection pattern formed of insulating material as a domain defining means on the opposing electrode and the cell thickness adjusting layer;

forming a first vertical alignment film which covers the opposing electrode and the projection

25 pattern at least on the opposing electrode;

forming a plurality of pixel electrodes on an upper side of a second substrate;

forming a second vertical alignment film for covering the pixel electrodes; and

arranging the first substrate and the second substrate such that their surfaces on which the first vertical alignment film and the second vertical alignment film are formed respectively are opposed to each other and top end portions of the projection pattern come into contact with a second substrate side.

15. A method of manufacturing a liquid crystal display device, comprising the steps of:

forming a light shielding film and a resist film for covering the light shielding film by forming a metal film and a photosensitive resist film on a first substrate, and then patterning the photosensitive resist film and the metal film by a photolithography method so as to leave the metal film and the photosensitive resist film in regions between pixel regions;

20 forming red, green, and blue color filters in the pixel regions so as to form one color filter or more on the resist film;

forming an opposing electrode on the color filters;

25 forming a projection pattern formed of insulating material as a domain defining means on the opposing electrode;

forming a first vertical alignment film which

covers the opposing electrode and the projection pattern at least on the opposing electrode;

forming a plurality of pixel electrodes on an upper side of a second substrate;

5 forming a second vertical alignment film for covering the pixel electrodes; and

arranging the first substrate and the second substrate such that their surfaces on which the first vertical alignment film and the second vertical alignment film are formed respectively are opposed to each other and top end portions of the projection pattern come into contact with a second substrate side.

16. A liquid crystal display device comprising:

a first substrate having a plurality of first electrodes formed on one surface side and a first vertical alignment film for covering the plurality of first electrodes;

20 a second substrate having red, green and blue color filters arranged to oppose to the plurality of first electrodes on the first substrate, a light shielding film which is formed by a blue color filter and a red color filter formed on the blue color filter around red pixels and is formed by a blue color filter and a green color filter formed on the blue color filter around green pixels, a second electrode for covering the color filters and the light shielding film, and a second vertical alignment film for covering the

second electrode; and

a liquid crystal sealed between the first substrate and the second substrate and having a negative dielectric anisotropy.

5 17. A color filter substrate comprising:

a palette;

red, green and blue color filters formed on predetermined regions of the plate;

10 a light shielding film which is formed by a blue color filter and a red color filter formed on the blue color filter around red pixels and is formed by a blue color filter and a green color filter formed on the blue color filter around green pixels;

15 an electrode for covering the color filters and the light shielding film; and

a vertical alignment film for covering the electrode.

18. A liquid crystal display device according to claim 16, further comprising a projection pattern which 20 is formed on the second electrode on the second substrate and is covered with the second vertical alignment film;

wherein top end portions of the projection pattern come into contact with the first substrate to keep a 25 clearance between the first substrate and the second substrate constantly.

19. A method of manufacturing a liquid crystal

display device, comprising the steps of:

forming blue color filters in blue pixel regions and light shielding regions on a first substrate;

5 forming red color filters in red pixel regions and the light shielding regions around the red pixel regions and the blue color filters which are located on a part of the light shielding regions around the blue color filters on the first substrate;

10 forming green color filters in green pixel regions and the light shielding regions around the green pixel regions and the blue color filters which are located on remaining part of the light shielding regions around the blue color filters on the first substrate;

15 forming an opposing electrode on the red color filters, the blue color filters, and the green color filters;

forming a projection pattern formed of insulating material as a domain defining means on the opposing electrode;

20 forming a first vertical alignment film which covers the opposing electrode and the projection pattern;

forming a plurality of pixel electrodes on an upper side of a second substrate;

25 forming a second vertical alignment film for covering the pixel electrodes; and

arranging the first substrate and the second

substrate such that their surfaces on which the first vertical alignment film and the second vertical alignment film are formed respectively are opposed to each other and top end portions of the projection pattern come into contact with a second substrate side.

5 20. A liquid crystal display device comprising:

a first substrate having a plurality of first electrodes formed on one surface side and a first alignment film for covering the plurality of first electrodes;

10 a second substrate having red, green and blue color filters arranged to oppose to the plurality of first electrodes on the first substrate, a black matrix formed by overlapping at least two color filters, a second electrode for covering the color filters and the black matrix, and a second alignment film for covering the second electrode; and

15 a liquid crystal sealed between the first substrate and the second substrate and having a negative dielectric anisotropy;

20 wherein a redundant light shielding film for cutting off a blue color is formed on outside portions of display regions in which the plurality of first electrodes are arranged.

25 21. A liquid crystal display device according to claim 1, further comprising a second projection pattern formed between the first electrode and the first

vertical alignment film on the first substrate to have a height lower than the first projection pattern.

22. A liquid crystal display device according to claim 1, further comprising slits provided to the first electrode on the first substrate.

5 23. A liquid crystal display device according to claim 2, wherein the blue color filters of the color filters are formed at a different height from other color filters.

10 24. A liquid crystal display device according to claim 2, wherein the light shielding film is formed of black resin to be thicker than the color filters.

15 25. A liquid crystal display device according to claim 2, wherein the light shielding film is formed by overlapping at least two color filters or more including the blue color filters.

20 26. A liquid crystal display device according to claim 2, further comprising a second projection pattern formed between the first electrode and the first vertical alignment film on the first substrate.

27. A liquid crystal display device according to claim 2, further comprising slits provided to the first electrode on the first substrate.

25 28. A method of manufacturing a liquid crystal display device according to claim 6, further comprising the step of forming a second projection pattern of insulating material over the pixel electrodes after the

step of forming a plurality of pixel electrodes on the upper side of the second substrate.

29. A method of manufacturing a liquid crystal display device according to claim 6, wherein the light shielding film is formed of black resin, and the color filters are formed thinner than the light shielding film.
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30. A method of manufacturing a liquid crystal display device according to claim 6, wherein the blue color filters of the color filters are formed at a different height from other color filters.
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31. A method of manufacturing a liquid crystal display device according to claim 7, further comprising the step of forming a second projection pattern of insulating material over the pixel electrodes after the step of forming a plurality of pixel electrodes on the upper side of the second substrate.
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32. A method of manufacturing a liquid crystal display device according to claim 7, wherein at least ones of the red color filters, the green color filters, and the blue color filters are formed at a different height from other color filters.
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33. A liquid crystal display device according to claim 12, wherein a thickness of the light shielding film is thicker than those of the color filters.
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34. A liquid crystal display device according to claim 12, wherein the light shielding film is formed of

a metal film or a metal compound film and resist formed on the metal film or the metal compound film.

35. A liquid crystal display device according to claim 18, wherein an inclination angle between the red pixel regions and the light shielding film formed around the red pixel regions and an inclination angle between the green pixel regions and the light shielding film formed around the green pixel regions are set smaller than 30 degree.

10 36. A liquid crystal display device according to claim 18, wherein a level difference between the red pixel regions and the light shielding film formed around the red pixel regions and a level difference between the green pixel regions and the light shielding film formed around the green pixel regions are set to less than 1.5 μm .

15 37. A liquid crystal display device according to claim 20, wherein the redundant light shielding film is formed of metal or metal compound.

20 38. A liquid crystal display device according to claim 20, wherein the redundant light shielding film is formed of a UV coat film whose cut-off wavelength is less than 500 nm.

25 39. A liquid crystal display device according to claim 20, wherein the redundant light shielding film has a three-layered structure which is formed of the red, green, and blue color filters.